

Technical Support Document (TSD)
Phoenix Brick Yard
Permit Number: V97-021
June 6, 2005

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I. INTRODUCTION COMPANY DESCRIPTION

This permit is a Title V permit for Phoenix Brick, located in Phoenix, Arizona. Phoenix Brick is currently permitted under the permit number of 8602395. Due to the amendments of 1990 to the Clean Air Act, Phoenix Brick was designated a major source for Hazardous Air Pollutants (HAPs) and therefore subject to the Title V permitting procedures of the Clean Air Act. The Phoenix Brick facility produces a structural clay product (brick).

A. Company Information:

Facility Name:	Phoenix Brick	
Mailing Address:	1814 S. 7 th Ave	Phoenix, AZ 85007
Facility Address:	1814 S. 7 th Ave	Phoenix, AZ 85007

B. Attainment Classification:

The Phoenix Brick facility is located in southern Phoenix, Arizona, which is currently designated non-attainment for ozone, carbon monoxide and PM₁₀.

II. PROCESS DESCRIPTION

The Phoenix Brick facility manufactures structural clay products and falls under the source industrial classification code (SIC) numbers 3251 and 3271.

The brick production process begins by trucking, to the facility, the clay raw material (various types of common clay). The clay raw material contains fluorides, chlorides and hazardous metals that are released during the processing of the material into bricks. The clay material is stored into different storage piles located in an open lot on the westward portion of the facility. A water sprinkler system and a water truck are utilized to control emissions from these piles. About 99% of the clay raw material will be processed through the Tunnel Kiln process line and 1% through the Roller Kiln process line. Occasionally before the material is processed, small amounts of manganese dioxide, barium carbonate and iron oxide are mixed with the clay to produce colors. These additives are stored in bags and used as needed.

A front-end loader transfers the clay raw material onto a conveyor leading to the enclosed grinders (hammermills), where the material is pulverized. The pulverized material will then go through a screening process where the oversize is recycled back into the same grinder. Each grinder-screen pair is vented to a dust collector (baghouse). The screened material is then held in storage bins. The material is transferred from the storage bins to the brick machines (pugmills). At the brick machines the material is mixed with both Additive-A (calcium lignosulfate polymer) and water during the brick extrusion process. Collection vents are located above the conveyor drop points at the brick machines, which are vented to a dust collector. The brick machines produce a moist mixture of materials, usually over 20% moisture, and form brick columns. The brick columns are transferred to the brick cutter, where it is cut into appropriate sized bricks. Lubricating oil is applied to the outside of the bricks to reduce friction during extrusion.

The formed bricks are loaded onto kiln cars (Tunnel Kiln) or dryer cars (Roller Kiln) and moved into a holding room and then they are gradually moved into the natural gas dryer. The temperature of the dryer is kept at a constant 300 °F. The dryer is heated through waste heat from the kiln, ambient outside temperature and natural gas (usually only necessary in the winter). Once the bricks are dried, they are gradually moved into the kilns, where most of the natural gas is burned. The

firing temperature in the tunnel kiln is approximately 1,930 °F. Each kiln car spends at least 33 hours in the Tunnel Kiln.

After the bricks are removed from the kiln they are packaged and stored for shipment. Haul trucks deliver the packaged bricks to the customer.

In addition, an ancillary process at the facility is using a natural gas round kiln to heat-treat steel. This process is only used as required.

III. EMISSIONS

Emissions were calculated through a variety of resources and methods such as test data, the Environmental Protection Agency volume on emissions factors (Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources*), mass balances, and emissions factors established by Maricopa County Emissions Inventory Unit. Table 1, illustrates the sections from AP-42 utilized to determine emissions factors for PM₁₀, CO, NO_x, HCl and additional hazardous air pollutants (HAP) related to Phoenix Brick's operations. However, emissions of HF were calculated using a mass balance approach and source testing conducted on the raw material used by Phoenix Brick. Emissions of SO_x were calculated from an emission factor from AP-42 plus an emission factor produced by lab testing supplied by the vendor of Additive A. The Additive A binding material produces SO₂ during the high temperature processing through the kiln. Emissions of volatile organic compounds (VOC) from gasoline storage tank filling were determined using emissions factors obtained from Maricopa County Emissions Inventory Help Sheet for Fuel Storage and Handling. Emissions of other VOC were calculated using a mass balance approach and assuming all of the material used is emitted as a VOC. Table 2 shows the emissions factors associated with each process or equipment.

Table 1: AP-42 sections used to determine emissions factors.

Section	Title
1.4	Natural Gas Combustion
11.3	Bricks and Related Clay Products
13.2.1	Paved Roads
13.2.2	Unpaved Roads
13.2.4	Aggregate Handling and Storage Piles

Table 2: Emissions Factors for Phoenix Brick Production

Process or equipment	Units	CO	NOx	SOx	PM10	VOC	NPOC	HF	HCl
Solid raw material storage	lb/ton processed				0.0278				
Front-end loader unloading	lb/ton processed				0.0024				
Raw material grinding and screening	lb/ton fired brick				0.0023				
Brick extrusion	lb/ton fired brick				0.0036				
Lube oil in dryer (diesel) – material to be replaced	lb/gal					7.51			
Lube oil in dryer (diesel) – material to be replaced	lb/gal					7.08			
Dryers	lb/ton fired brick	0.31	0.098	0.24	0.187	0.03	0.11		
Kilns	lb/ton fired brick	1.2	0.35	0.904	0.87	0.024	0.038	1.602(max.) 1.438(avg.)	0.17
Heat treat steel	lb/MM ft3	84	100	0.6	7.6	5.5			
Fugitive dust due to vehicles (paved roads)	lb/VMT				1.74				
Fugitive dust due to vehicles (unpaved roads)	lb/VMT				1.89				
Solvent tank	lb/gal					6.42			
Gasoline storage	lb/yr					265.4			
Vehicle refueling: displacement losses	lb/1000 gal					11			
Vehicle refueling: spillage	lb/1000 gal					0.7			

Table 3, shows the potential to emit, the potential to emit after a voluntary accepted permit condition limiting production, and actual emissions for the year 2001 for the criteria pollutants (CO, NOx, SOx, VOC, PM₁₀) total HAPs and single HAP of significant amounts (i.e., HF and HCl).

Table 3: Pollutant emissions from Phoenix Brick

Criteria Pollutants	Potential (ton/yr)	Potential After Production Limit ⁵ (ton/yr)	Actual 2001 ⁶ (ton/yr)
Carbon Monoxide (CO)	69	66	36.7
Nitrogen Oxides (NOx)	21	20	11.5
Sulfur Dioxide (SOx) ¹	52	50	29.3
Volatile Organic Compounds (VOCs) ²	15 (8)	3	13.3
PM10	56	54	27.8
TSP	90	84	---
HAPS ³	74	70 (60)	41.2
- Hydrogen Fluoride ⁴	65	62 (52)	36.8
- Hydrogen Chloride	7.7	7.4	4.4

Notes:

¹ Sulfur Dioxide is produced due to the addition of a binding material called Additive A, which is Calcium Lignosulfate. The sulfate is converted to SOx during the heat treatment of the bricks.

² See discussion below on VOC emissions from the volatilization of lube oil in the dryer.

³ HAPS include HF, HCl, and less than 1 ton of other HAPs associated with brick manufacturing.

⁴ The number indicated in parentheses is based on a voluntarily accepted daily average HF limit of 287 lbs/day. Refer to the discussion below on HF emissions. The potential HF emission of 62 tons per year is based on the production limit discussed in note 5 and an average HF emission factor of 1.438 lb HF / ton of brick processed.

⁵ The maximum voluntarily accepted production limit is 9.9 tons/hr, which is based on the MACT control applicability threshold of 10 tons/hr. However, Phoenix Brick has also voluntarily agreed to limit production such that HF emissions do not exceed a daily average of 287 pounds over a one-month period. The HF emission rate that is to be calculated is based on data from a series of source test results. Therefore, the production limit necessary to comply with the average HF emission rate limit of 287 lbs/day will vary depending on the emission factor. However, the maximum production limit is not to exceed 9.9 tons/hr.

⁶ Actual 2001 HAPS are not reported on Annual Emissions Inventory Reports submitted to MCESD. Therefore, HAP emissions were estimated using the reported production level and an HF emission factor of 1.438 lbs. HF/ton brick, and an HCl emission factor of 0.17 lb HCl/ton brick.

VOC Emissions from the Volatilization of Lube Oil in the Dryer

Lube oil is used to allow the bricks to be released from their molds easily. Phoenix Brick uses no. 2 diesel fuel and Darval 150 as lube oils. Estimates of potential VOC emissions indicated in the permit application included VOCs from the volatilization of lube oil in the dryer. In the application it was assumed that the lube oils consisted of 100% VOC and that all of the lube oil used was emitted as VOC in the dryer. To maintain VOC emissions less than 15 pounds per day (while subject to temperatures in excess of 200°F) pursuant to Rule 330, Phoenix Brick will substitute the diesel fuel and Darval 150 with 76 Unax AW 32. According to a letter from Phoenix Brick's consultant (SECOR International, Inc.), dated November 21, 2002, the substitution is to take effect by the end of November 2002. Also according to this letter, Unax AW 32 has a negligible volatility and a flash point in excess of 374°F, and therefore would not be released at the temperature in the dryer. Any material released in the kiln would be thermally oxidized.

Hydrogen Fluoride Emissions

Phoenix Brick voluntarily accepted a production limit of 9.9 tons per hour in order to minimize the possibility of being subject to the control requirements of the proposed MACT standards (40 CFR Part 63, Subpart JJJJ – National Emission Standards for Hazardous Air pollutants for Brick and Structural Clay Products Manufacturing). Under the now final MACT, an existing tunnel kiln with a federally enforceable permit condition that restricts kiln operation to less than 10 tons per hours on a 30-day rolling average basis is not subject to the add on control requirements of the rule.

In Table 3, potential HF emissions were based on a maximum production capacity of 10.37 tons per hour (for potential emissions), or a voluntarily accepted production limit of 9.9 tons per hour (for potential emissions after production limit), along with an average HF emission factor of 1.438 lb HF / ton of brick processed. This emission factor was determined by the mass balance results of fluorine sampling of raw material, along with the assumption that 100% of the fluorine lost is converted to HF. The resulting potential HF emissions, with and without the production limit, are 62 tons per year and 65 tons per year, respectively. However, using the maximum HF emission factor of 1.602 lb HF / ton of brick processed, the potential HF emissions with and without the production limit are 70 tons/yr and 73 tons/yr, respectively.

In addition to the federally enforceable limit of 9.9 tons per hour, Phoenix Brick has also voluntarily agreed to limit production such that HF emissions do not exceed a daily average of 287 pounds per day over a one-month period. The daily average limit was based on dispersion modeling results submitted with the permit application. According to the modeling results, the HF emission rate input into the model necessary to limit the maximum 1-hr HF concentration to a level that does not exceed the 1-hr Arizona Ambient Air Quality Guideline (AAAQG) for HF is 1.5079 grams per second. Assuming the kilns operate 24 hours per day, the HF emission rate corresponds to 287 pounds per day. In order to be more certain that the 1-hr AAAQG for HF will not be exceeded during any one-hour period, a more ideal HF emission limit would be based on an hourly timeframe such as 12 pounds per hour. This would require hourly record keeping, which can be burdensome to facilities like Phoenix Brick. The HF emission rate voluntarily accepted by Phoenix Brick is a daily average over a one-month period. Therefore, it is possible that Phoenix Brick could comply with the average HF emission limit of 287 pounds per day and still exceed the 1-hr AAAQG for HF. In addition, if the kilns are not operated 24 hours per day, or the majority of throughput into the kilns occurs over a period of time less than one day, it is possible that Phoenix Brick could comply with the average HF emission rate of 287 pounds per day, while exceeding the 1-hr AAAQG for HF.

IV. COMPLIANCE HISTORY

Table 4 shows all the Compliance Status Notifications (CSN) issued to Phoenix Brick. The CSN's were issued during a level 2 source inspection. The source took appropriate action to resolve the issues and ensure compliance.

Table 4: Compliance Status Notifications

ID # (if applicable)	Date issued	Rule	Description
12-14-00-01	12/7/00	316 §305.1.b.	Failure to submit an Operation and Maintenance Plan to the Control Officer for approval of each emissions control system and monitoring devices (four Baghouses)

12-14-00-02	12/7/00	353 §502.2	Failure to maintain records of weekly fill tube, vapor valve and spill containment inspections.
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Nine citizen complaints have been documented since the permitting of Phoenix Brick in 1986. The complaints were generally in regard to odor and dust concerns from the facility. All complaints were investigated and the appropriate action or determination was conducted.

V. APPLICABLE REQUIREMENTS

A. Voluntary Accepted Permit Conditions (Permit Conditions 18.E and 19.F)

1. Discussion:

Phoenix Brick voluntary accepted permit conditions limiting HF emissions to 287 pounds per day, averaged over a one-month period. The limit was accepted to minimize the possibility that the maximum HF emissions would exceed the Arizona Ambient Air Quality Guidelines (AAAQGs) for HF. The limit was obtained from the HF emission rate used during the ISC3 modeling. Phoenix Brick also voluntarily accepted a maximum production limit of 9.9 tons per hours, averaged over a 30-day rolling period. This limit was accepted in order to minimize the possibility of becoming subject to the (at the time) proposed MACT (Subpart JJJJ) with its control requirement threshold of 10 tons per hour.

2. Monitoring for Compliance (Permit Condition 20.F.1):

The Permittee must maintain a daily and 30-day rolling total throughput record for the kilns and a daily and 30-day rolling total operating time record for the kilns. To monitor for compliance with the federally enforceable production limit of 9.9 tons per hour, the average throughput into the kilns is to be calculated over a 30-day rolling period. Results of this calculation are to be recorded daily. Also, to monitor for compliance with the voluntarily accepted HF emission rate of 287 pounds per day, HF emissions are to be calculated and recorded once per month, and the production limit is to be calculated each time the HF emission factor is updated pursuant to testing (Permit Condition 19.F.1).

3. Reporting requirements (Permit Condition 21.A.):

To ensure compliance, the Permittee must submit with their semi-annual report, the throughput records and calculations required in Permit Condition 20.F.

B. County Rule 300 - Opacity Limits (Permit Condition 18.A)

1. Discussion:

County Rule 300 restricts visible emissions from any source to 20% opacity, other than emissions of uncombined water. County Rule 300 and the 20% opacity limitation of these permit conditions are locally enforceable only. SIP Rule 30 and the 40% opacity limitation of these permit conditions are federally enforceable.

2. Monitoring for Compliance with Opacity Limits:

Since Phoenix Brick produces a structural clay product (brick) from a clay raw material, numerous opportunities for dust emissions in exceedance of 20% opacity are available. Therefore, Phoenix Brick has installed and utilized baghouses, water trucks and water sprinklers to reduce opacity emissions to comply with these regulations.

However since the chance of visible emissions are available each day, The Permittee will monitor for compliance with the opacity requirements of this permit by conducting a daily walk around the facility, looking for visible emissions from any source capable of visible emissions other than uncombined water (**Permit Condition 20.A.1.a**). An important part of this inspection should be the baghouses, conveyors and storage piles. This requirement is intended to regulate the opacity from all dust generating sources and kiln stacks.

If emissions are observed, the Permittee is required to obtain an EPA Method 9 reading by a certified reader immediately after the observation. In addition the reading must be taken daily thereafter during each day that the unit is in operation until there are no visible emissions during operation (**Permit Condition 20.A.1.b**). The Permittee is required to document any corrective action taken to reduce or eliminate emissions.

C. SIP Rule 32F – Sulfur Oxide Emissions (**Permit Condition 18.A**)

1. Discussion:

SIP Rule 32F limits sulfur oxide emissions into the ambient air to a level such that the ground level concentration at any place beyond the premises on which the source is located does not exceed the following limit:

Concentration of Sulfur Dioxide	Averaging time
850 $\mu\text{g}/\text{m}^3$	1 hour
250 $\mu\text{g}/\text{m}^3$	24 hours
120 $\mu\text{g}/\text{m}^3$	72 hours

2. Monitoring for Compliance with Sulfur Oxide Emissions:

Maricopa County has evaluated dispersion modeling results that were submitted with the permit application and understands that offsite concentrations at the maximum potential to emit from the facility are less than 4% of the applicable standard pursuant to SIP Rule 32F. Therefore, no additional monitoring, reporting or record keeping requirements were necessary to assure compliance. Dispersion modeling is discussed in Section X.

D. County Rule 310 – Fugitive Dust Sources (**Permit Condition 18.B**)

1. Discussion:

County Rule 310 requires that during dust generating operations, visible fugitive dust emissions do not exceed 20% opacity. It also requires a company to submit and follow a "dust control plan" (**Permit Condition 23.B**) before beginning any dust generating operations. The Permittee has submitted a dust control plan and has been approved by the Department.

2. Monitoring for Compliance with Particulate Matter Requirements

To monitor for compliance with these requirements, the Permittee shall keep a daily written log recording the actual application of implementation of the control measures delineated in the approved Dust Control Plan. **(Permit Condition 20.B.1)**

E. County Rule 316 - Particulate Matter from Clay Raw Material Handling Operations **(Permit Condition 18.C)**

1. Discussion

County Rule 316 restricts stack emissions from exceeding 7% opacity and containing more than 0.02 gr/dscf (50 mg/dscm) of particulate matter. Also fugitive dust emissions from any transfer point on a conveying system are restricted to not exceeding 7% opacity. Fugitive dust emissions from any crusher are restricted to 15% opacity. Also any affected operation or process source is restricted to fugitive dust emissions that do not exceed 10% opacity. Lastly, fugitive dust emissions from truck dumping directly into any screening operation feed hopper or crusher are limited to 20% opacity.

Since the Permittee has proposed the use of baghouses on the grinders and brick making equipment, the permit requires that these pieces of equipment be vented to a baghouse anytime the equipment is in operation. The allowable emission rate from the stacks of the baghouses is 0.02 grains/dry standard cubic foot. This is the same standard as applies to the New Source Performance Standard, Subpart OOO of 40 CFR Part 60 for nonmetallic material processing industries. Since this standard has been demonstrated as being achievable on many occasions, it is reasonable that the testing to be conducted for Phoenix Brick can also show compliance with the applicable standard.

2. Monitoring for Compliance **(Permit Condition 20.C)**

- a. To monitor for compliance with these requirements, the Permittee is required to keep daily records for all days that a plant is actively operating. The records shall include hours of operation, throughput per day of raw materials and the amount of each raw material delivered per day. In addition, Records of baghouses shall be kept and shall include dates of inspection, dates and designation of bag replacement, dates of service or maintenance related activities and static pressure readings. Records of time, date and cause of all control device failure and down time shall also be maintained.
- b. Also, the Permittee shall record periods of time that an approved emissions control system (ECS) is used to comply with these permit conditions. The pressure drop and visible emissions from the baghouses must be recorded and any operations outside of the stated range must be investigated and any corrective actions must be recorded and reported. The records shall account for any periods when the control system was not operating.

F. County Rule 320 - Odors and Gaseous Air Contaminants **(Permit Conditions 19.A)**

1. Discussion:

County Rule 320 §§300, 302 and 303, entitled "Gaseous and Odorous Emissions," "Material Containment Required" and "Reasonable Stack Height Required," respectively, apply to this facility and have been incorporated into the permit conditions. Permit conditions based on County Rule 320 are locally enforceable only and permit conditions based on SIP Rule 32 are federally enforceable.

2. Monitoring for Compliance with Rule 320 Limitations:
 - a. To monitor for compliance with these requirements, the Permittee is required (**Permit Condition 20.A.2**) to maintain an odor complaint log containing a description of the complaint, date, time and other information and submit a copy of this log with the semi-annual monitoring report.
 - b. Also, as part of a weekly facility walkaround, the Permittee is required (**Permit Condition 20.D.2**) to make sure reasonable measures are being taken to prevent the evaporation of VOCs into the air, including making sure containers are properly covered when not used.
- G. County Rule 330 – Operational Requirements for Volatile Organic Compounds (**Permit Conditions 18.D and 19.D**)
 1. Discussion:
 - a. When evaporating a VOC at temperatures exceeding 200 °F (93.3 °C) in the presence of oxygen, the Permittee is limited to discharging no more than 15 pounds (6.8 kg) (**Permit Condition 18.D**) of VOC into the atmosphere in any one day from any machine, equipment, device or other article.
 - b. When using any cleaning liquids with more than 10% VOC content, the Permittee is required (**Permit Condition 19.D.1**) to collect used liquids in a closed container, dispose of them in a manner such that no VOCs will be emitted to the atmosphere, and clean equipment in a vat which will remain closed when not in use.
 - c. The Permittee is also required (**Permit Condition 19.D.2**) to take the measures to minimize VOC emissions when storing, discarding or disposing of VOC-containing materials. For the purposes of minimizing VOC emissions the marble casting machines will have all openings closed whenever possible. Fresh and waste solvent, and solvent-soaked rags and residues shall be stored in labeled (if 1 gallon or larger) containers when not in use and records of all disposal or recovery must be kept. If any solvent escapes from a container, it must be wiped or removed immediately.
 2. Monitoring for Compliance
 - a. Lube oil is used to allow the bricks to be released from their molds easily. Phoenix Brick used no. 2 diesel fuel and Darval 150 as lube oils. Estimates of potential VOC emissions indicated in the permit application included VOCs from the volatilization of lube oil in the dryer. In the application it was assumed that the lube oils consisted of 100% VOC and that all of the lube oil used was emitted as VOC in the dryer. To maintain VOC emissions less than 15 pounds per day (while subject to temperatures in excess of 200°F) pursuant to Rule 330, Phoenix Brick will substitute the diesel fuel and Darval 150 with 76 Unax AW 32. According to a letter from Phoenix Brick's consultant (SECOR International, Inc.), dated November 21, 2002, the substitution is to take effect by the end of November 2002. Also according to this letter, Unax AW 32 has a negligible volatility and a flash point in excess of 374°F, and therefore would not be released at the temperature in the dryer. Any material released in the kiln would be thermally oxidized. Therefore, in order to comply with the 15 pounds VOC per day limit, Phoenix Brick is required to use a lube oil with a vapor pressure of less than 1 mm Hg at 20 °C.
 - b. A list of all the VOC containing materials used at the facility will be kept stating the VOC content and monthly records of usage and disposal shall be kept. (**Permit Condition 20.D.1**)

- c. To monitor for compliance with these requirements, the Permittee will conduct a weekly walk-through of the facility and observe that reasonable measures are being taken to prevent VOC evaporation. **(Permit Condition 20.D.2)** Observations will be logged and included in the semiannual report.

H. County Rule 353 – Gasoline in Stationary Dispensing Tanks **(Permit Condition 19.E)**

- 1. Discussion:
County Rule 353 §§301, 302 and 305.2, entitled "Basic Tank Integrity," "Fill Pipe Requirements" and "Exemptions," respectively, apply to this facility and have been incorporated into the permit conditions. Phoenix Brick is exempt from the vapor recovery requirements of Rule 353 §303 since the gasoline storage tank is limited to 120,000 gallons of gasoline in any 12 consecutive calendar months.
- 2. Monitoring for Compliance:
 - a. To monitor for compliance with these requirements, the Permittee is required to maintain accurate records showing the quantity of all gasoline delivered to the facility. The records will include total gasoline received each month and the 12-month rolling total. **(Permit Condition 20.E.1)**
 - b. Also, the Permittee is required to conduct and record results of weekly inspections and each time the submerged fill pipe is reinstalled. The records shall indicate each fill pipe removal date of replacement and the date and results of the follow up inspection. However, the Department's Technical Guidance Memo TG00-002 allows inspections and recordkeeping to be conducted less frequently if delivery of gasoline occurs less than weekly. **(Permit Condition 20.E.2)**

I. Reporting Requirements **(Permit Condition 21)**

Reporting requirements for Phoenix Brick are found in the General Conditions of the permit (Sections 1-17) and Section 21 of the permit.

Section 21 requires the submission of a semi-annual monitoring report, including deviation reporting. The report should be very detailed and should include information such as any day, week or month that any monitoring was required but not performed, the reason for those deviations, and any action taken to ensure that the monitoring will be performed in the future. Additionally, deviations from specified operating ranges or emission limitations or standards should be included, with any additional information.

To allow the Permittee flexibility in coordinating the filing of the semiannual monitoring reports with other data gathering and reporting activities at the facility, the Permittee may select the initial reporting period to be less than 6 months. However, follow-up reporting periods must be in 6-month intervals starting from the end of the initial reporting period.

VI. TESTING REQUIREMENTS

1. Baghouses **(Permit Condition 22.A)**

Permit Condition 18.C limits the Permittee's baghouse stack emissions to containing no more than 0.02 gr/dscf (50mg/dscm) of particulate matter. The baghouses at Phoenix Brick have never been tested to verify compliance with this standard. Therefore, the baghouses associated with the Tunnel Kiln process line, labeled in the equipment list as DC-001, DC-003 and either DC-002 or DC-004, are required to be tested to show stack emissions contain no more than 0.02 gr/dscf (50mg/dscm) of particulate matter. Since DC-004 and DC-002 are similar baghouses, only one of these two is required to be tested. The baghouse to be tested will be determined by the Department.

The following discussion provides justification for testing in accordance with Rule 200 §309.2.

- a. The U.S. EPA has particulate matter with a diameter less than 10 µm (PM-10) as a criteria pollutant, which adversely affects human health when airborne. Since the baghouses associated with the kilns have not been tested to verify compliance with the particulate matter emission standard of 0.02 grains/dscf from the exhaust stack of the kilns, the Department has determined it necessary to conduct source testing on the baghouses associated with the kilns.
- b. The test method to be used is EPA Method 5, an approved EPA test method that has shown to produce scientifically acceptable results.
- c. EPA Test Method 5 has been determined to be technically feasible.
- d. EPA Test Method 5 has been shown to demonstrate reasonably accurate results.
- e. After examining the estimated cost of the test, the Department believes that the cost of a stack-sampling test of the control devices is reasonable to determine the effectiveness of the control device, to establish a base line of emissions, to avoid potential fines, to establish parametric monitoring, to demonstrate adequacy of a maintenance program on equipment or controls, to provide emissions rate information for possible future PSD/NSR modeling requirements, and to establish emissions rate information for environmental justices purposes.

2. **Kiln Stack Testing and Testing of Fluorine Content of Brick (Permit Condition 22.B)**

Permit Condition 18.E was voluntarily accepted in order to minimize the potential for HF emissions to exceed the AAAQGs for HF. The HF emission rate was determined based on ISC3 modeling results. The HF emission rate used in the model was 1.5079 grams per second, which corresponds to 287 pounds per day. To verify the HF emission rate, Phoenix Brick is required to perform testing on the Tunnel Kiln stacks and on the fluorine content of the bricks prior to and after firing in the kiln. The test method proposed by Phoenix Brick for the mass balance testing of fluorine has been reviewed and approved by the Department. The test method can be found in the report titled An Engineering Based Study to Minimize the Impact of Requirements of the Clean Air Act in Brick Manufacturing, which is attached to this Technical Support Document. However, to determine the correlation between HF emissions and fluorine content of the raw material, Phoenix Brick will be required to conduct an initial stack test of the Tunnel Kiln stacks. Another purpose of conducting an initial stack test is to determine if an appropriate emission rate was used in ISC3 modeling.

The mass balance testing of fluorine within the brick will involve measuring the fluorine content in a brick before and after being exposed to a temperature of 1,930 °F in the Kiln. Since all the fluorine that is lost is assumed to be emitted as HF, this method is conservative for estimating HF emissions. The mass balance testing will be conducted three times per year. The purpose of subsequent mass balance testing is to obtain a sufficient amount of data to determine an HF emission factor [lbs HF / ton of brick fired] and to account for any potential variability in fluorine content within the raw material.

The following discussion provides justification for testing in accordance with Rule 200 §309.2.

- a. The U.S. EPA has identified hydrogen fluoride (HF) as a hazardous air pollutant (HAP). The Arizona Department of Health Services (ADHS) has developed health-based guidelines for certain air contaminants. These guidelines are referred to as Arizona Ambient Air Quality Guidelines (AAAQGs). The AAAQGs are residential screening values that are protective of human health, including children. According to ADHS, chemical concentrations that exceed AAAQGs may represent a health risk. Phoenix Brick has voluntarily accepted a production limit that, based on ISC3 modeling, will minimize the potential for HF emissions to exceed the AAAQGs for HF. Testing is necessary to verify that predicted HF emissions will not exceed the health-based guideline.

- b. The test method to be used for measuring the HF emission rate from the kiln stacks is EPA Method 26A. This method has been shown to produce scientifically acceptable results. The test method to be used for conducting a mass balance on the fluorine content of the brick to estimate HF emissions is not an EPA approved test method, however, the proposed method has been reviewed by the Department and has shown to produce scientifically acceptable results. This test method is a mass balance determination of fluorine within the brick. It is assumed that 100% of fluorine lost is converted to HF and is emitted into the atmosphere. The test method was obtained from a technical report titled, An Engineering Based Study to Minimize the Impact of Requirements of the Clean Air Act in Brick Manufacturing.
- c. Based on the review of the test methods and the operations conducted at Phoenix Brick, the Department has determined that the test methods are technically feasible.
- d. Since the fluorine content sampling test method is based on a simple material balance and the assumption that 100% of the fluorine lost is converted to HF and is emitted into the atmosphere, the Department has determined that this method is conservative for determining HF emissions. In addition, both test methods have shown to produce reasonably accurate results.
- e. After examining the estimated cost of testing, the Department believes that the cost is reasonable to determine emissions of HF and to provide emissions rate information for possible future MACT applicability requirements and PSD/NSR modeling requirements, and to establish emissions rate information for environmental justices purposes.

VII. PREVIOUS PERMITS & PERMIT CONDITIONS

Phoenix Brick was first permitted as a stationary pollutant source prior to 1986. During 1986 Maricopa County switched to computer generated permitting numbers and therefore, Phoenix Brick was then permitted under the permit number 8602395. Due to the amendments of 1990 to the Clean Air Act, Phoenix Brick was designated a major source for Hazardous Air Pollutants (HAPs) and therefore subject to the Title V permitting procedures of the Clean Air Act.

No modifications subject to permitting procedures have been performed at Phoenix Brick since the issuing of permit number 8602395.

VIII. NON APPLICABLE REGULATIONS

- 1) County Rule 310.01: Fugitive Dust from Open Areas, Vacant Lots, Unpaved Parking Lots and Unpaved Roadways:

County Rule 310.01, entitled "Fugitive Dust from Open Areas, Vacant Lots, Unpaved Parking Lots and Unpaved Roadways," is applicable to open areas, vacant lots, unpaved parking lots and unpaved roadways, which are not regulated by County Rule 310 of these rules and do not require a permit or a dust control plan. Since Phoenix Brick is required to have both a Title V permit and an approved dust control plan County Rule 310.01 is not applicable.

- 2) County Rule 311: Particulate Matter from Process Industries:
County Rule 311, entitled "Particulate Matter from Process Industries," is applicable to any affected operation, which is not subject to the provisions of County Rule 316, entitled "Nonmetallic Mineral Mining and Processing." Therefore, since County Rule 316 is applicable to Phoenix Brick, County Rule 311 is not applicable.
- 3) 40 CFR 60 Subpart NSPS OOO "Nonmetallic Mineral Processing Plants"
The NSPS standard subpart OOO applies to any nonmetallic mineral processing plants constructed after August 31, 1983 and has a capacity greater than 10 tons/hr. The only piece of equipment constructed at Phoenix Brick after August 31, 1983 is the Roller Kiln processing line. However, Phoenix Brick took a voluntary accepted permit condition limiting their production to 9.9 tons/hr of

combined throughput through their Tunnel and Roller Kiln. Also, based on a letter (October 17, 1997) from Phoenix Brick's consultant (SECOR International Inc.) to the U.S. EPA, the maximum production rate achieved in Roller Kiln processing line was 6.4 tons per hour, while operating at 100% capacity. Therefore, 40 CFR 60 Subpart NSPS OOO "Nonmetallic Mineral Processing Plants," is not applicable.

4) Compliance Assurance Monitoring (CAM) (40 CFR 64):

The application shows that Phoenix Brick Yard uses baghouses to meet the standards for emissions outlined in County Rule 316 entitled "Nonmetallic Mineral Mining and Processing." The unit is classified as a small unit, which by definition means a unit that has post control potential to emit less than major source thresholds. Since the unit is considered a small unit, CAM does not need to be addressed until the renewal of this permit. Therefore, CAM is not applicable at this facility at this time.

IX. FUTURE APPLICABLE REQUIREMENTS

When the permit entered the public notice process, 40 CFR 63 Subpart JJJJJ, National Emission Standards for Hazardous Air Pollutants for Brick and Structural Clay Products Manufacturing was a proposed standard. Since Phoenix Brick is classified as a major source for Hazardous Air Pollutants, they will be subject to the standard. The facility will have to comply with the requirement of the permit to submit an application to demonstrate how they will comply with this standard in the future. The facility will also have to comply with the requirements of County Rule 325 which limits the emission of particulate matter from the tunnel kiln by December 31, 2006.

X. MODELING

ISC3 modeling was conducted for Hydrofluoric acid (HF), Hydrochloric acid (HCl) and Sulfur Dioxide (SO₂) according to MCESD "Air Toxics/Hazardous Air Pollutant Permitting Procedure" (2/29/00 Draft). Only these chemicals were modeled due to the significant level of emissions. The model was conducted using the emission rate of HF (i.e., 1.5079 g/s). A ratio was applied to determine the concentration levels for HCl and SO₂. An HF emission limit was voluntarily accepted to minimize the potential of exceeding the AAAQGs for HF.

The HF emissions are released through the kiln stacks. Two stacks (north and south stacks) are present on the kiln where the HAPs are emitted. The kiln is operated 24 hours per day, 7 days per week for a total of 8,760 hours per year. The bricks are passed through the kiln at a constant rate and therefore, assuming a constant fluorine content of the brick mix, the HF emissions are emitted at a constant hourly rate. Thus, based on the HF emission rate used in the model, the annual HF emissions are 52.4 tons per year.

The following parameters were used for modeling:

HF Emission Rate:	11.97 lb/hr (52.4 ton/yr)
HCl Emission Rate:	1.25 lb/hr (5.5 ton/yr)
SO ₂ Emission Rate:	8.48 lb/hr (37 ton/yr)
Building Dimensions:	243'L X 72' W X 26'H

Table 5: Kiln stacks parameters

Stack	North	South
Height (ft)	31.5	31.5
Diameter (ft)	3.9	3.9
Exit Gas Velocity (ft/s)	34.3	52.3
Exit Gas Temperature (°F)	379	593

Table 6: ISC3 Model results compared to ambient air concentration guidelines

	HF		HCl		SO₂	
($\mu\text{g}/\text{m}^3$)	Predicted	AAAQG	Predicted	AAAQG	Predicted	SIP Rule 32F
Max. 1-hr	41	42	4.3	210	29.1	850
Max. 24-hr	5.8	20	0.6	56	4.1	250

The results in Table 6 demonstrate that both the AAAQGs for HF and HCl and SIP Rule 32F ambient concentration limit for SO₂ were not exceeded based on modeling input parameters.

In a letter from the Department, dated September 19, 2002, Phoenix Brick was notified that the air quality dispersion model provided in the Title V application did not account for the presence of the rain caps on the kiln stacks. Phoenix Brick was asked to either resubmit modeling results that are representative of facility operations (i.e., stack configuration) or remove the rain caps to ensure that the facility is operating consistently with the model input parameters. On October 1, 2002, Phoenix Brick removed the rain caps that were located directly above the kiln stacks. This allowed the unhindered vertical rise of the stack plume. The presence of the rain caps redirected the stack emissions horizontally. The removal of the rain caps should reduce fence line concentration of pollutants and reduce odors.